CHAPTER THIRTEEN

PUBLIC HEALTH IN THE FACE OF GLOBAL ECOLOGICAL AND CLIMATE CHANGE

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Introduction

Traditional public health over the centuries has focused on a few areas. It has ensured the health of communities through good sanitary practices, regulatory regimes that keep air and water clear of pollution and safe for inhalation and consumption purposes respectively, and soil quality that better ensures food safety and security. Also, since the advent of the smallpox vaccine by Edward Jenner in 1796, various immunization programs against contagion from several other debilitating diseases have been the mainstay of public health.

Now, as humanity, both individually and collectively, tampers with the very fabric of life through the global expansion of the human enterprise, Nature's services that provide pure air, clean water, and uncontaminated soils are under siege. Additional changes include biodiversity loss, population growth with ever-widening disparities, over-consumptiveness and hazardous waste disposal, escalating demands on fossil fuels for energy and consumer products, and on technological gaps between the more advanced and less advanced economies, globally.

The effect of the changes that are under way is a net negative, with systemic impacts such as climate change, declines in air, water and soil quality, as well as food security issues around the world. If epidemiology is to usefully inform policy on matters of such global import, as it has traditionally done in the past on matters globally but bearing on more local public health concerns, then more support for the sub-specialty of eco-epidemiology is needed.

Eco-epidemiologists study the dynamics between global ecological changes and population health. By studying these dynamics, the public and policy-makers could be better informed about the need for policy interventions to serve ecological integrity, biocentric in its essence, thereby being better informed about the need to implement policies to sustain **all** life. In so doing, we would help humans to see their integral connection to the ecosystems in which we live, with consequences that will more ensure human well-being and the ongoing of civilization.

Pre- and post-global change practice of epidemiology

Those working in the field of epidemiology examine the distribution and determinants of illness and premature death at the community level. Epidemiology, derived from the Greek *epi* ("on") and *demos* ("populations"), is the science that is basic to the rational formulation of public health policy. Epidemiologists work to, among other things, provide information to policy-makers for interrupting the causes of disease, whether we are speaking about infectious and acute causes, or about causes related to people being chronically (or acutely) exposed to toxic contamination of any kind.

The goal of the discipline is to work to prevent harms to communities. Our job is to inform policy with a view to reducing harms by preventing disease and premature mortality at the community level. Exercising precautionary approaches is fundamental to what we do.

Ideally, epidemiology is proactive, maximizing opportunities to minimize harms to community health and well-being. The old maxim applies: "An ounce of prevention is worth a pound of cure." However, epidemiologists more often find themselves reactively responding to problems that could well have been prevented. In these latter circumstances, costs and harms are higher than what they would have been had early warnings been heeded.

Today, under the extensive range of global changes taking place, there is an even greater need to be proactive if we are to prevent harms on a massive scale. As we approach ecological system tipping points, we are less likely to avoid thresholds being exceeded at which point whole system collapses will not necessarily permit practical reactive responses. Therefore, how can we more effectively deliver on our professional obligation to prevent harms on a population scale under the current scenario of global ecological change?

It behooves those in the field of epidemiology, inasmuch as what we are trained to identify the causes of disease, to be able to identify the

reasons for why early warnings so often go unheeded. The answer, in large part, lies in the effect of vested interests bringing pressure to bear on policy-makers. Information is presented by self-interested groups (e.g. tobacco companies and other corporate entities) that foment uncertainty and thus make the work of the policy-maker all the more difficult in the face of less rather than greater certainty.

The Nature of Epidemics and Pandemics

Epidemics occur when low background rates of specific diseases and premature deaths are replaced by increasing rates of these events. Pandemics occur when these events expand globally.

Major trends have been discernible in epidemiology over the past 100 years. Through the First World War, the focus was on epidemics of infectious/communicable diseases. With the advent of penicillin and other antibiotics since then, infectious diseases were considered controllable. Then, with people living longer, an inexorable rise was seen in the incidence of chronic, non-communicable diseases. These surfaced with tobacco, occupational diseases and environmental disasters that have resulted in epidemics of chronic conditions and premature death for those who survived beyond the initial exposure episode.

By 1981, with the advent of HIV/AIDS, the realization that communicable diseases were re-emerging came to the fore. It was only in the late 1990s, however, that the link was being made to the potential for catastrophic harms to populations on a rather massive scale from encroachment into the wild and with consequent declines in ecological integrity. Indeed, illness and premature death from global warming and desertification are already resulting in eco-refugees on a grand geographic scale, serving as a forerunner of multiple harms to come.

The Nature of Epidemics under Global Change

The recent consolidation of many indicators of ecological (dis)integrity suggests the imminent collapse of life as we know it. Collapse will take the form of not only premature death and excess morbidity, but also in the collapse of civilization through mass harms that are unfolding as we continue to disrupt life-supporting ecosystems through climate change and other stresses being placed on ecosystems.

Why should epidemiologists and public health researchers and practitioners be concerned with matters of a global nature? The reason is that we have the professional mandate to prevent harms to the health of

communities; on a global scale, this mandate ought to be taken all the more seriously. Our mandate stems from ethical precepts based in the right to life. As such, and with looming global catastrophes, the Right to Life for both present and future generations (inter-generational equity/justice) is of concern to the eco-epidemiologist. This is especially so as epidemics turn into pandemics, and when risks to health and, indeed, to the survival of the species are so great as to extend from local communities to act on a global scale.

What is the real meaning of the right to health?

> "It has been shown that external agents have as great an influence on the frequency of illness as on its fatality, the obvious corollary is that man has much power to prevent as to cure disease ... Yet medical men, the guardians of public health, never have their attention called to the prevention of sickness; it forms no part of their education ... The public does not seek the shield of the medical arts ... till the arrow of death already rankles in the veins ..." (Gostin 2008: 18–19)

Perhaps a "vibrant conception of the common" (Gostin 2008: 6) is the most important aspect of public health. But the meaning of the "common good" is not obvious, although indeed health is an overarching collective right. Already in 1837, it was known that prevention was not at the forefront of the concerns of society or state governments. If, as Gostin argues, the physical protection of the citizens is the first concern of any government, then such protection should be extended beyond all other services expected from democratic governments, and it should start with preventing the exposures that are widely known in the 21st century to harm health and cause morbidity and premature mortality.

We consider the progression of public health in developed countries, first, from infectious and communicable diseases, to the non-communicable (chronic) diseases. Today, the poorest countries are facing the "epidemiological transition from infectious to non-communicable diseases" (Gostin 2008: 237). In earlier times, infectious diseases were the main concern of public health. But, just as many infectious diseases appeared to have been conquered (Gostin 2008: 237), other circumstances again arise (Garrett and Rosenstein 2005: 64–69):

> "Disease amplifiers are principally man-made and therefore controllable. Human beings congregate and travel, live in close proximity to animals, pollute the environment and rely on an overtaxed health system. This constant cycle of congregation, consumption, and movement allows infectious diseases to mutate and spread across populations and boundaries." (Gostin 2008: 234)

Gostin explains that "ecosystem degradation has multiple health effects" (Gostin 2008: 235), and he also explains the consequences of "Human/animal interchange" (Gostin 2008: 235), as he indicts the "overuse and inappropriate use of pharmaceuticals" by animal agriculture, but he does not go far enough.

Once the collective rights of all citizens are considered first, as they should be in public health law, and when the responsibilities and obligations of governments are taken seriously, it seems clear that the protection of the health of all should start *before* persons become ill and health care is required:

> Yet, just as infectious diseases move and change, so do the non-communicable diseases [NCDs]. The global rise in NCDs reflects significant transformations in diet habits, physical activity levels, and tobacco use worldwide. The process of industrialization, urbanization, economic development, and increasing food market globalization, has led to harmonization of behavior. What was once culturally attractive primarily in industrialized countries has gained popularity all over the world."

However, while many of these factors leading to ill-health represent deliberate (though often manipulated) individual choices, the major determining issues are beyond such choices, as they depend on the interface between state governance and multinationals' choices for "development".

A recent article published by The Lancet (Backman et al. 2008: 2047–2085) argues that the Universal Declaration of Human Rights (1948) "laid the foundations for the right to the highest attainable standards of Health", and concludes that "Right-to-health features are not just good management, justice, or humanitarianism, they are obligations under human rights law" (Backman et al. 2008: 2047).

In addition, Gostin cites the International Sanitary Regulations (ISR), adopted by the member states of the World Health Organization (WHO), pursuant to the WHO's Article 21 powers. Since 1969, these regulations were renamed International Health Regulations (IHR) (Gostin 2008: 246). In 2005, they were fundamentally revised to include many global pandemics, such as HIV/AIDS, SARS, avian flu, Marburg, and even bioterrorism (Gostin 2008: 246; Fidler 2005: 325–392; Forrest 2000: 153–179; Taylor 1997: 1327–1362). Article 1 of the IHR defines a public health risk as follows:

> "… a likelihood of an event that may adversely affect the health of human populations, with emphases on one which may spread internationally or may present a serious and direct danger."

But, it is not only infectious diseases that fit well within that definition; also, not only an "event", but ongoing practices that may and, indeed, do affect the health of human populations, as well as present "a serious and direct danger". This definition fits with the consequences of ecological degradation, including hazardous pollution, climate change and industrial activities that include those aimed at "development", particularly extractive and mining operations.

The public health effects that flow from these declines are based on solid and abundant evidence, as well as on the research of the WHO itself, the European Environmental Agency (EEA) and of scientists too numerous to name. Hence, at the very least, the current way that these activities are practiced, as well as their effects, should fall under the heading of evident and clear threats to public health. They should form part of the responsibility of states to oversee, correct and mitigate, or even to eliminate. Figure 1 shows only the "underlying determinants of health (e.g., water, sanitation, food, shelter and education)", without any reference to the negative aspects of globalized living that form the real "underlying determinants" of ill-health and abnormal development.

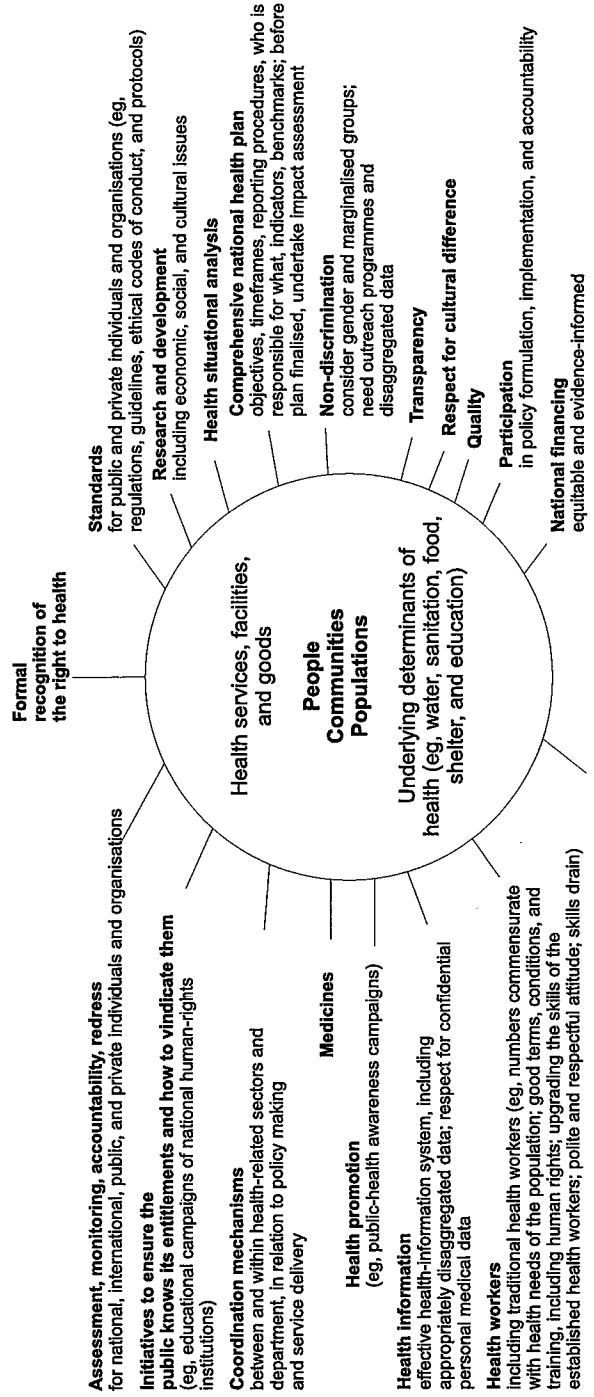

Figure 13-1. Right-to-health features of a health system underpinned by legal obligations based on general comment 14: preliminary working model

If we accept the claims advanced by *The Lancet's* article and the general sense of Gostin's seminal work, then the right to health appears to be a collective right "par excellence", or the clearest example of a collective right that must be considered primary and basic. It is a collective right not only to health care *after* the fact of various chemical and hazardous exposures, but also the right to health and normal human development before being exposed to the litany of harmful situations listed above. And, by extension, global effects from a degraded and unproductive environment, anthropogenically produced climate change, desertification leading to famine, and the like, must be considered similarly.

It is unfortunate that neither legal scholars, nor experts in public health declare the clear obligation of states, and of other non-state actors, to work to promote public health through prevention, first and foremost. First, preventive measures serve to reduce significantly or even eliminate the suffering of millions who either have not chosen the source of their health problems (such as cigarette smoking), or have not consented to the situations that engender those problems. Thus, second, it is far more equitable to reduce or prohibit all of the activities that cause the harms, than it is to attempt to redress the harms, once they have occurred.

Third, many of the harms, after they have been imposed on a population, are incompensable, and abnormal births, or children born only to acquire grave diseases both mental and physical, are clear examples (Grandjean and Landrigan 2006). Fourth, the cost of prevention to states and other responsible bodies is a fraction of the cost to attempt to redress the harms to public health after they have occurred, and that states themselves have either supported or helped to promote (e.g., by licensing unsafe operations, by not signing conventions intended to curb industrial harm, or by accepting support from corporations producing unsafe conditions and products).

The right to health and social justice

The uneven distribution in harms caused is of particular concern to epidemiologists and public health practitioners, especially if one believes in, or if one aspires to notions of fairness and justice in the world. For instance, it is not those causing the climate and ecological changes that are suffering the consequences arising from those changes.

Invocation of the ethical principle of environmental justice as well as a focus on the human right to an environment that can sustain both present and future generations are needed if we are to demonstrate to policy-

makers the inequity and non-sustainability of current trends that are exacerbating climate and ecological system declines. In a rational policy environment, it is only by being able to demonstrate the connections between socio-economic activities and their attendant harms that policy is likely to be changed to create, on the one hand, incentives for behaviours (individually and collectively) that are less likely to contribute to ecological harms; and, on the other hand, disincentives for behaviours (individually and collectively) that are more likely to cause ecological harms. Hence the need to encourage the work of eco-epidemiology.

The World Health Organization on the social determinants of health

In 1986, the Ottawa Charter for Health Promotion was the first international document to recognize that health promotion is the process of enabling people to increase control over, and to improve their health. The Charter recognizes that

> to reach a state of complete physical, mental and social well-being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment.
>
> Health is, therefore, seen as a resource for everyday life, not the objective of living.
>
> The fundamental conditions and resources for health are:
>
> - Peace
> - Shelter
> - Education
> - Food
> - Income
> - A stable eco-system
> - Sustainable resources
> - Social justice and equity

In the spirit of social justice, the Commission on Social Determinants of Health (i.e., the Commission) was set up by the World Health Organization (WHO) in 2005 to marshal the evidence on what can be done to promote health equity and to foster a global movement to achieve it. In 2008, the WHO produced a seminal report on the social determinants of health, recognizing that social justice is a matter of life and death. Social

justice affects the way people live, their consequent chance of illness, and their risk of premature death.

The latter three bullet points above, as "conditions and resources for health", relate directly to concerns that emerge through declines in ecological integrity globally, particularly where impacts locally are driven by forces operating elsewhere. Climate change is but one example of drivers in rich countries causing direct harms in poorer countries.

Even without a focus on climate change and other drivers of global change, we watch in wonder at the disparities in health across the world. Life expectancy and good health continue to increase in some parts of the world, but not in others. And the gulf widens. A girl born today can expect to live for more than 80 years if she is born in some countries, but less than 45 years if she is born in others. Within countries there are dramatic differences in health that are closely linked with degrees of social disadvantage. "Differences of this magnitude, within and between countries, simply should never happen" according to the WHO report.

These inequities in health, avoidable health inequalities, arise because of the circumstances in which people grow, live, work, and age, and the systems put in place to deal with illness. The conditions in which people live and die are, in turn, shaped by political, social, and economic forces. These differences are only exacerbated under climate and other global changes. Increasingly, the health problems that rich and poor countries have to solve are converging around disparities.

The Commission calls on the WHO and all governments, in its 2008 report, to lead global action on the social determinants of health with the aim of achieving health equity.

> It is essential that governments, civil society, WHO, and other global organizations now come together in taking action to improve the lives of the world's citizens. Achieving health equity within a generation is achievable, it is the right thing to do, and now is the right time to do it.

The report calls on those with a passion for social justice, a respect for evidence, and a frustration that there appears to be far too little action on the social determinants of health to join forces recommending action now. And, with all of the global drivers of ever-widening disparities, this call is all the more important.

Where systematic differences in health are judged to be avoidable by reasonable action they are, quite simply, unfair. It is this that the report labels "health inequity". Putting right these inequities is, according to the report, a matter of social justice. Reducing health inequities is, for the Commission, an ethical imperative. Social injustice is killing people on a

grand scale. On an eco-regional basis, the injustice of climate change is but one example.

The report of the Commission sets out key areas – of daily living conditions and of the underlying structural drivers that influence them – in which action is needed. It provides a global analysis and concrete examples to justify action regardless of the level of socio-economic development. In countries at all levels of income, health and illness follow a social gradient: the lower the socioeconomic position, the worse the health. Three principles of action are recommended in the report of the Commission:

1. Improve the conditions of daily life – the circumstances in which people are born, grow, live, work, and age.
2. Tackle the inequitable distribution of power, money, and resources – the structural drivers of those conditions of daily life – globally, nationally, and locally.
3. Measure the problem, evaluate action, expand the knowledge base, develop a workforce that is trained in the social determinants of health, and raise public awareness about the social determinants of health.

Moving the EcoHealth agenda forward

Eco-epidemiology is emerging. Starting with the Journal "Ecosystem Health", which then morphed into the Journal "Global Change and Human Health", and then into "EcoHealth", the field is evolving. Indeed, research undertaken by members of the recently established International Association of Ecology and Health (IAEH) is critical for making the linkages between the dynamics of ecosystem change and population health.

So promising are the signs of interest in EcoHealth that, in December 2008, an international conference convened some 700 delegates in Merida, Mexico. This conference produced a draft Call to Action, included as an appendix to this chapter. This is a response to the changing world. It signals what public health should be in this new world and what epidemiology should tell us if its mission to prevent health harms is to be encouraged.

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Appendix

DRAFT CALL FOR ACTION

TO THOSE DEDICATED TO RECONNECTING HUMANS TO THE ECOSYSTEMS OF WHICH THEY ARE A PART AND THEREBY TO RESTORING AND MAINTAINING THE HEALTH OF ALL LIFE FORMS

Colin L. Soskolne
Chair of Synthesis Plenary Session
International EcoHealth Forum 2008
Mérida, Mexico, December 1–5, 2008

THE ORIGINS OF THIS CALL FOR ACTION:

The ***International EcoHealth Forum 2008*** brought together researchers, policy-makers and civil society representatives to share experiences, evidence and theories at the intersection of ecology and health, locally, regionally and globally. The goal of the Forum was to identify options for the sustainability of ecosystems and human health.

Details about the Forum can be found at: www.ecohealth2008.org

The purpose of this **CALL FOR ACTION** is to rally *EcoHealth Forum 2008* participants and others to strive for changes in research, practice and policy that will better protect both ecosystem and human health, now and for generations to come.

CALL FOR ACTION

Overwhelmingly, interdisciplinary evidence from the *International EcoHealth Forum 2008* was compelling on the need for action to avert the rapid rate at which ecological decline is occurring around the world. Improved and sustained human health depends on healthier ecosystems and on sustainable ways of living. Indeed, in order to achieve health as a sustainable state of self-regulating harmony between humans and their physical, biological and social environments that enables them to co-exist indefinitely, urgent action is needed. We – responsible and concerned professionals, practitioners and civil society representatives – can and must help society, wherever in the world we live, to change course, from

one of ecosystem destruction, to one of global sustainability – locally, regionally and globally.

We, therefore, promote this **CALL FOR ACTION** by calling on our professional organizations, and on civil society and governments, to act with urgency on the following 14 points from our *International EcoHealth Forum 2008*:

1. We must work to engage with both community-based grassroots efforts and in the formulation of national, international and private-sector policies to move the world onto a sustainable path to secure a healthy future. Existing national laws and international agreements favouring sustainability and health must be upheld and enforced.
2. We must work to reconnect humans to the natural ecosystems of which we are a part and to which our futures are inextricably linked. Where existing research supports action, we encourage action; where more research is needed to reduce uncertainty and/or to eliminate gaps in knowledge, more high quality research should be undertaken.
3. We must adjust our lifestyles and expectations, both individually and collectively, to transform current paradigms destined to collapse to sustainable ways of life. All around the world there is a need to recognize the importance of ecosystem sustainability for human health and well-being.
4. Efforts to meet the 2015 **Millennium Development Goals** must be increased if the goals are to be met.
5. Our approach to research and practice must integrate the social and environmental dimensions of health with ecosystems, including the elimination of social inequalities and health disparities, regionally and globally.
6. We must expand awareness across generations, disciplines and sectors about the importance of shared values and ethics, foundational to a path of sustainability.
7. We must work to inform and influence policy at the highest levels. We do so by engaging with the actors ultimately able to make changes in policy and practice based on the evidence, be they in government, in the private sector, or in the community.
8. We must work to show that people need to better manage themselves rather than work to manage ecosystems.
9. We must work together and more effectively with local knowledge sources and a broad range of other stakeholders in adopting integrated, transdisciplinary approaches to face the complex problems of today.
10. Researchers among us must win the community's trust if they are to remain relevant and have lasting impact.
11. We must work to reduce fragmentation in Governance.
12. We must work to establish stronger inter-sectoral public health policies that include those communities traditionally marginalised or excluded from decision-making processes.
13. Delegates at future EcoHealth conferences must continue to strive to ensure the participation of a broad range of stakeholders; from funders and employers, to affected communities, indigenous peoples, policy-makers, and international development agencies, and from NGOs to business interests.
14. We respect those among us who have worked for years and even decades to bring attention to our collective ecological plight. It is on their shoulders that we stand today. We recognize the forces that have undermined their efforts and brought us to the current state of ecological decline. We therefore commit to joining with their legacy to protect the global public health interest above any other narrow short-term interests.

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